Binary : base 2 counting : 0,1

base 10: $\frac{210}{517} = 5\times10^2 + 7\times10^1 + 1\times10^0$

base 2: $\frac{3210}{1101} = \underset{8}{1\times2^3} + \underset{4}{1\times2^2} + 0\times2^1 + \underset{1}{1\times2^0} = 13$

Convert 13 to base 2

$13/2 = 6 \text{ r } 1 \quad = 1101$
$6/2 = 3 \text{ r } 0$
$3/2 = 1 \text{ r } 1$
$1/2 = 0 \text{ r } 1$

Hexadecimal : 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F

$707_{16} = 7\times16^2 + 0\times16^1 + 7\times16^0$

$707_{10} \Rightarrow X_{16}$

$\frac{707}{16} = 44 \text{ r } 3$
$\frac{44}{16} = 2 \text{ r } 12$
$\frac{2}{16} = 0 \text{ r } 2$

$\Rightarrow 2C3$

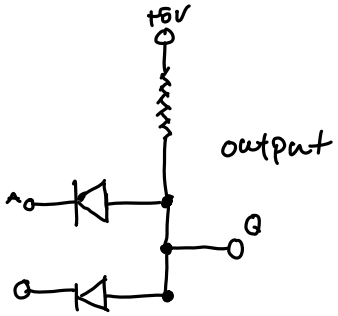
707 => binary

$707_{10} \Rightarrow \underbrace{0010}_{2} \ \underbrace{1100}_{12} \ \underbrace{0011}_{3}$

$\frac{707}{2} = 353 \text{ r } 1$
$\frac{353}{2} = 176 \text{ r } 1$
$\frac{176}{2} = 88 \text{ r } 0$
$\frac{44}{2} = 22 \text{ r } 0$
$\frac{22}{2} = 11 \text{ r } 0$
$\frac{11}{2} = 5 \text{ r } 1$
$\frac{5}{2} = 2 \text{ r } 0$
$\frac{2}{2} = 1 \text{ r } 0$
$1/2 = 0 \text{ r } 1$

Logic Gates

1 : High : +5V
0 : Low : 0V



Truth table

A	Q
0	1
1	0

NOT

A	B	Q
0	0	1
1	0	1
0	1	1
1	1	0

NAND

A	B	Q
0	0	1
1	0	0
0	1	0
1	1	0

NOR

A	B	Q
0	0	0
1	0	1
0	1	1
1	1	0

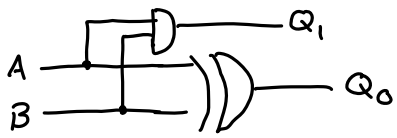
XOR

A	B	Q
0	0	0
1	0	0
0	1	0
1	1	1

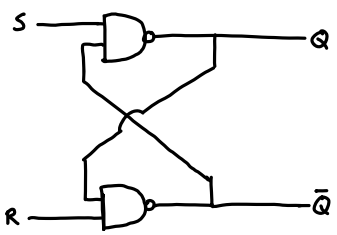
AND

A	B	Q
0	0	0
1	0	1
0	1	1
1	1	1

OR



A	B	Q_1	Q_0
0	0	0	0
1	0	0	1
0	1	0	1
1	1	1	0



S and R start High
- Q starts low
- $\bar{Q}$ starts high

R to Low
- Q goes to low
- $\bar{Q}$ goes to high

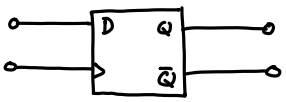
S Goes To Low
- Q changes to high
- Q changes to low

S to Low
- Q changes to high
- $\bar{Q}$ stays high

S To High
- Q stays high
- $\bar{Q}$ stays low

S to High
- Q changes to low
- $\bar{Q}$ stays high

D Flip Flop



D	Q	$\bar{Q}$
0	0	1
1	1	0